

REPORT OF TWO CASES OF LAMINECTOMY, WITH
A TABULATED COLLECTION OF FIFTY-
TWO CASES OF LAMINECTOMY
OF RECENT DATE.

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OF the two cases reported below, one demonstrates in the highest sense the good results of such operation, and the other shows the typical course of spinal fracture with paralysis unrelieved by operation, but with subsidence of pain and the absence of any indication of the fatal issue impending.

Both operations substantiate the fact that laminectomy in recent injuries of the spinal column, causing compression of the cord and its associate symptoms, is a justifiable operation. The severe hæmorrhage spoken of by some authors as a particular danger in the performance of laminectomy was not experienced in either of these cases.

The laminae in both cases were removed by means of large angular bone forceps, and the periosteum was preserved as much as possible. Chloroform was the anæsthetic used in each. I am indebted to Dr. Jas. Kerr, my chief, for permission to report these two cases.

CASE I.—Willis W., aged twenty-two years, colored, laborer, born in Virginia. He was brought into the hospital in a patrol-wagon at 4.30 A.M., November 22, 1893, suffering from a bullet-wound of the spine. On examination, a small external wound was found over the region of the last dorsal vertebra. Sensation was intact, but motion completely lost from the hips down. He complained of excessive pain, more particularly referred to the legs. This was about an hour after the injury. Subsequently during the day sensation from the knee to the toe was lost and all the lower reflexes abolished. His wound was dressed with bichloride gauze, and his condition of shock

was treated by stimulants and external heat. Morphine sulphate was given to alleviate his intense pain, which at the time was attributed in great part to his excited mental condition. Both bladder and bowels were paralyzed. His pain continuing and the paralysis progressively extending, at 3 P.M. of the 22d, laminectomy was done, such operation being deemed advisable, as the progressive symptoms indicated pressure on the cord. The spinal column was exposed by a linear incision over the region of the wound. The periosteum was separated, and portions of three laminae were removed. The canal, thus opened, was explored for the bullet. A piece was found loose in the canal and removed, having entered between the laminae of the twelfth dorsal and first lumbar vertebrae. The cord presented a rather contused appearance, and was split in the middle. There was some extravasation of sanguineous fluid into the canal, but no direct evidence of a spinal hemorrhage of any importance. The wound was irrigated with sterilized salt solution at about a temperature of 100° F., and closed by means of a full-curved Hagedorn needle with deeply-buried sutures, and a superficial subcutaneous suture after the manner of Halstead. A catgut drain was inserted, and iodoform gauze was laid over the wound, and over this was placed the ordinary covering of sterilized gauze and cotton.

Catheterization was ordered every six hours, and on the third day his bladder was washed out with a solution of boracic acid. This washing was continued daily until January 1. His temperature rose to 101.6° F. after the operation, but remained within a few points of the normal until December 27, when it rose again to 102° F. This elevation was apparently of no significance as the temperature fell on the following day. His pain disappeared immediately after the operation, and, with the exception of a few paroxysms, has been eliminated ever since. Sensation gradually returned, until now it is complete. Motion was first noticed about November 29, seven days after the operation. The first manifestation was movement of the sartorii. Gradually the motion was restored in the right limb, and he now has fairly good use of it, considering the length of his confinement. The left leg is still paralyzed, with the exception of the thigh movement of the sartorius and some motion in the foot.

The urine has remained normal throughout. A median cystotomy was done, and a catheter left *in situ* for over six weeks. This procedure was demanded owing to a stricture of the urethra. On January 1 he requested a urinal, and voluntarily passed four ounces of urine.

Two days later the catheter was removed, and the cystotomy wound allowed to heal. He now passes his urine voluntarily, has control over his bladder, and has exhibited no symptoms of cystitis. The patient's physical condition is good, and he has maintained a good appetite throughout. There are signs of emaciation in the parts affected, naturally resultant on non-use, but very little elsewhere. The laminectomy wound healed by first intention, the wound being redressed and the superficial suture and drain removed on the sixth day.

Faradization was applied daily to the bladder and rectum by means of the urethral and rectal electrodes. He now has perfect continence of these parts, and this treatment has been discontinued. Electricity has been administered to his lower extremities, and progressive improvement has been noticed, and massage is about to be commenced. His spine has been incased in a plaster-of-Paris jacket for the last month, and he wheels himself about most of the day in an invalid chair. No bedsores developed. There is no curvature apparent, and the results of the operation have been in every way most satisfactory, and we have every reason to attribute his improved condition to the operation and subsequent treatment.

The most remarkable feature of this case is the absence of cystitis. The fact that the bladder was continually drained by the catheter *in situ* after the median operation seems to confirm the theory that the cystitis following spinal injury is primarily due to distention,—*i.e.*, the paralyzed bladder-wall offers no resistance to the accumulation of urine, and its vitality is lowered by the constant distention, hence inviting the early invasion of sepsis. It is practically impossible to have in daily use a catheter absolutely aseptic. Approximation towards this is the best we can do, with all the care we may use.

CASE II.—W. W., aged twenty-seven years, white, born in Virginia. He was brought to the hospital at 8 P.M. on October 13, having been struck by the street-car. There was no external wound, but evidences of contusion. His pain was intense, and referred to the seat of injury. There was complete paralysis of motion and sensation of the legs and lower two-thirds of the thigh. Pressure in the lumbo-dorsal region intensified the pain. Although crepitus could not be distinctly elicited, a slight deformity, together with the

history of the accident and the existing symptoms, made the diagnosis of fractured spine easy. The patient was in an extreme condition of shock when admitted to the ward. On reaction from this condition he suffered intense girdle pain, which he described as "a sensation of constant pressure on his ribs as though by spiked rings." This was relieved only by successive doses of morphine sulphate, one-eighth grain, hypodermically. Both bladder and bowels were paralyzed. Catheterization was ordered, and on the appearance of a cloudy urine and a rising temperature, his bladder was irrigated with sixteen ounces of boracic acid solution, using about three to four ounces at a time. This has been continued twice daily since then. The girdle pain continuing greater, and the paralysis, both sensory and motor, extending to about three inches below the umbilicus, laminectomy was deemed advisable, and was done at 11.30 A.M., October 19.

The spine of the first lumbar vertebra was found to have been fractured and driven in or impacted. The cord was greatly lacerated and contused. The laminae of this vertebra, together with the two adjoining vertebrae (last dorsal and second lumbar), were removed, and the wound dressed as before. Immediately after the operation the girdle pain disappeared, but there was no relief of the paralysis, either motor or sensory, then or subsequently. The head of the bed was elevated and his head put in a suspension apparatus attached to the head of the bed, from which counter-extension could be made in the direct spinal line. This was discontinued shortly, owing to the extra amount of pain it caused, but the bed, however, was left on an inclined plane. His temperature chart has been very irregular, varying during the three months from 97° to 103°, having a mean of about 99° F. An enormous bedsore of the buttocks developed, notwithstanding our most careful attention, but is filling in very satisfactorily, the patient now being on a water-bed. There was delayed union in the laminectomy wound, which is now in good condition.

Our catheters were kept in sterilized towels, and were syringed with bichloride solution, 1 to 1000, both before and after catheterization. Before use they were immersed in a solution of glycerin and carbolic acid, two per cent., and again in sterilized oil. Notwithstanding all these precautions, which were adhered to strenuously, believing that cystitis rather than a symptom of fractured spine is resultant on careless continued catheterization, symptoms of cystitis developed, but subsided under the vesical irrigation with boracic

solution. His bowels are opened on alternate days by salines or enemata. The patient at the present time enjoys a fair appetite, and his general condition is good. He suffers no pain except on movement, but shows no evidence of any improvement as to the subsidence of paralysis, either of limbs, bowels, or bladder.

Pil. arsen. acid, gr. $\frac{1}{8}$, t.i.d., and pil. fe. quin. et strychnin, t.i.d., have been ordered as a tonic. There is still some deformity present, but it seems to be diminishing gradually.

From the library of the Surgeon-General, U. S. A., and other sources, I have been able to collect fifty-two cases of laminectomy within the last few years. I have endeavored to make my list include those cases reported since Dr. Samuel Lloyd¹ presented his very admirable article on 103 cases of spinal surgery. This is the most extensive collection of which I have knowledge at the present writing. Dr. J. William White has collected 37 cases of recent date. This list is intended to take up the work where the labors of Drs. Lloyd and White have left it. The most recent statistical study of cases of spinal surgery that I have found is that of R. Rieder.² Dr. A. Chipault³ has collected 33 cases of spinal surgery, and reports 2 new cases. Mr. W. A. Lanc⁴ reports 11 cases, and presents an excellent article on technique, advantages, etc., of the operation.

Quite a tribute to the advance of modern antiseptic surgery is shown in the progressive improvement in the results of laminectomy. Dr. Lloyd reports of his non-antiseptic cases a mortality of 65 per cent. Those cases surviving the operation are distributed as follows: Cured, 1; partially cured, 7; unknown, 2; no improvement, 5. Of those cases operated on under the modern antiseptic surgery the mortality was 50 per cent.; those surviving are distributed as follows: Cured, 4; partially cured, 15; no improvement, 11. Dr. White, whose cases were all done under antiseptic precautions, reports a mortality of 38 per cent. Of those surviving there were 6 complete recoveries, 6 with benefit, and 11 without marked benefit.

¹ American Journal of Medical Sciences, July, 1891.

² Jahrbücher der Hamburg Stadtskrank., Leipzig, 1892, 236-301.

³ Arch. gén. méd., Paris, 1890, 11, 673-713.

⁴ Trans. Clin. Soc., London, 1891-92.

In the following list of 52 cases there are 15 deaths (a mortality of 29.4 per cent.), 26 recoveries with benefit, 5 recoveries without benefit, and 5 recoveries in which the ultimate result has not been observed. Warren's case, having been operated on in the non-antiseptic period of surgery, is excepted in these statistics. It must be mentioned that several of the fatal cases below reported have been those of cervical fracture, which is by far the most fatal variety.

By comparison it is obvious to the most casual observer that the operation of laminectomy has steadily progressed in value, and is now not only a probable operation, but under many circumstances absolutely advisable. Any communication on recent cases not mentioned below will be gladly received for the author's memoranda on this subject

LAMINECTOMY.—CASES OPERATED ON SINCE 1890.

No.	OPERATOR.	REFERENCE.	RESULT.	REMARKS.
1-11	W. A. Lane	Trans. Clin. Soc., London, 1891-92	Recoveries with improvement, 8 Recoveries without improvement, 1 Deaths, 2	All cases for paraplegia from compression.
12	C. M. Moulin	Internat. Clinics, 1892	Recovery	Fracture second lumbar.
13	G. A. Peters	Trans. Coll. Phys., Phila., 1892	Death	Tumor spinal meninges.
14	De F. Willard	"	"	Fracture.
15	"	"	"	"
16	S. Lloyd	Annals Surgery, Phila., 1892	Recovery	Potts's paraplegia.
17	Davies Colley	Brit. Med. Jour., 1891, II	Progressively worse	Pressure sarcoma. Rhachitomy.
18	"	Trans. Clin. Soc., London, 1891-92	Recovery; cure	Fracture.
19	M. A. Starr	Internat. Clinics, Phila., 1891	Recovery	Fracture.
20	Mr. Bowley	Brit. Med. Jour., 1891, II	"	"
21	"	"	"	"
22	A. W. Ridenour	Columbus Med. Jour., 1891-92	Recovery; successful	Fracture and dislocation.
23	H. A. Boyle	Med. and Surg. Rep., Phila., 1891	"	"
24	A. J. McCosh	New York Med. Jour., 1891	Death	Cervical vertebrae.
25	Golding Bird	Brit. Med. Jour., 1891	Recovery	Fracture. Operation third day.
26	F. D. Bird	Australian Med. Jour., 1893	No improvement	"
27	"	"	Recovery with improvement	"
28	H. O. Pantzer	New York Med. Jour., 1893	"	"
29	"	"	Death	Both cases some time after injury.
30	E. Freeman	Eclect. Med. Jour., Cincin., 1893	Recovery with improvement	Fracture.
31	A. Parker	Brit. Med. Jour., 1893, I	Recovery with continued improvement	Sixth to ninth removed.
32	W. K. Hatch	Brit. Med. Jour., 1892, II	Death on seventh day	Operation five months after injury.
33	J. C. Warren (report)	Annals Surgery, Phila., 1893, XVII	Death on eighth day	Operated on by J. Mason Warren, Boston, in 1897.

LAMINECTOMY.—CASES OPERATED ON SINCE 1890.—Continued.

No.	OPERATOR.	REFERENCE.	RESULT.	REMARKS.
34	Delorme	Bull. et Mém. Soc. de Chir. de Paris, 1893, XIX	Death six hours after operation	Seventh, eighth, ninth, tenth, and eleventh dorsal removed.
35	"	Bull. et Mém. Soc. de Chir. de Paris, 1893, XIX	Recovery with improvement	
36	Weiss	Mém. Soc. de Méd. de Nancy, 1890-91	Recovery in three months	Fracture.
37	Burrell	Arch. gén. de Méd., Paris, 1890, II, 677	Death in thirty-eight hours	Potts's disease. Reported by Chiari.
38	Chipault	Arch. gén. de Méd., Paris, 1890, II, 676-703	Recovery; general health good four months after	Potts's disease.
39	"	Arch. gén. de Méd., Paris, 1890, II, 676-703	Death in three weeks	
40	C. Audry	Lyon Méd., 1891, 335	Death day after operation	Fracture.
41	Guillot et Moret	Union Méd. du nord est Reims, 1891, XV, 361	Recovery with improvement	Potts's disease.
42	F. C. Schaeffer	Jour. Am. Med. Assoc., 1891	Recovery	Reports a case which may be considered virtually a laminectomy.
43	Soulham	Brit. Med. Jour., 1892, I	Spinal caries.
44	David Myerle	Brooklyn Med. Jour., 1893, II, 428	Death on sixth day	Fracture fifth cervical.
45	John B. Roberts	Medical News, Phila., 1894, 265	Recovery; no improvement	Three times operated on. Fracture.
46	"	" " " " " "	"	Hamaturia. Fracture.
47	"	" " " " " "	Death in five weeks from sepsis	Bedsores persistent. Fracture.
48	L. Steinhach	Ibid., 267	Death in two months	Death probably due to sepsis of bedsores.
49	Jas. Kerr	ANNALS OF SURGERY, June, 1894	Recovery with improvement	Operated on sixth day. Fracture.
50	"	" " " " " "	Recovery; little improvement	Operated on first day. Bullet-wound.
51	R. Nieder	Jahrbücher der Hamburg Stadtkrank., Leipzig, 1892, 236-301	Recovery complete	Fracture seventh and eighth dorsal.
52	"	Jahrbücher der Hamburg Stadtkrank., 1892, 236-301	Recovery; paralysis mentioned	Fourth lamina removed. Fracture sixth dorsal.